

**PORTABLE COMPUTER HAVING DISPLAY
SLIDABLY AND ROTATABLY MOUNTED
FOR MOVEMENT BETWEEN LANDSCAPE
AND PORTRAIT ORIENTATION AND TO
OPEN AND CLOSE SPEAKER PORTS**

FIELD OF THE INVENTION

This invention relates broadly to portable computers having a movable display screen and, more particularly, pertains to a laptop computer having a display screen which is rotatable between a landscape orientation in which the display screen has a longer dimension in a horizontal direction, and a portrait orientation in which the display screen has a longer dimension in the vertical direction.

**BACKGROUND AND SUMMARY OF THE
INVENTION**

In recent years, attempts have been made to provide non-portable, desktop-type computers with monitors or video display screens which can be pivoted to either a horizontally elongated, landscape orientation or a vertically elongated, portrait orientation for the purpose of accommodating variously-sized text and graphics formats. For example, U.S. Pat. No. 4,267,555 discloses a rotatable raster scan display employing a thrust bearing for rotatably mounting a CRT to a control cabinet. U.S. Pat. No. 4,542,377 also discloses a rotatable work display station in which the CRT is swingable about a rear control housing. Yet a further showing of a desk-type computer having a rotatable display supported on a fixing element is set forth in U.S. Pat. No. 5,329,289.

There have also been efforts to provide portable pen-based or hand held computers wherein the entire computer housing and integral display screen may be rotated in 90° increments as described in U.S. Pat. Nos. 5,100,098 and 5,432,720.

However, while the aforementioned desktop-type and pen-based portable computers have recognized the advantages of providing a rotatable display screen to optimize display capability, it has been discovered that such a desirable feature had not been developed for laptop computers. This is due in great part to the inherent construction of a laptop computer which is generally comprised of a cover incorporating a display screen which is pivotally mounted to a base about a horizontal axis. Because the cover is typically of a rectangular configuration of the same size as its base, the prior art has been limited in attempting to enhance the capability of the display screen. For instance, U.S. Pat. Nos. 5,016,849, 5,206,790 and 5,335,142 all relate to swivel/tilt mechanisms to enable a laptop monitor to pivot upwardly and downwardly with respect to a horizontal axis, and swing left to right about a vertical axis perpendicular to the base so as to widen the visual range and increase the working efficiency of the computer. Another direction has been taken in U.S. Pat. No. 5,128,662 which provides a collapsibly segmented screen to augment the visibility of the display.

Regardless of the current size or expanded sizes of laptop computers about to be introduced, it remains extremely desirable to provide a portable laptop computer having a display screen which is easily changeable from a landscape orientation to a portrait orientation. Such adaptability is intended to override the current limitations in screen size owing to portability of the laptop computer. It is also important to provide a rotating laptop computer display which will not increase the storage and transport volume of the laptops currently available.

Accordingly, it is a principal object of the invention to provide an improved display screen for use with a portable computer.

It is also a primary object of the invention to provide a laptop computer having a base and a cover with an integral display screen which is pivotable about a horizontal axis, and is rotatable about an axis perpendicular to the display screen when the cover is in a raised position relative to its base.

It is a further object of the invention to provide a swivel arrangement in the cover of a laptop computer which will translate linear movement of a display screen into a rotational movement so that the laptop computer can be adjusted between at least two orientations.

It is another object of the invention to provide a relatively simple cam and detent arrangement used in changing the disposition of a display screen in a laptop computer.

It is yet another object of the invention to provide a movable display screen, the position of which affects the sound characteristics of a multi-media laptop computer.

Still another object of the invention is to provide a laptop computer having a display screen slidable and rotatable with respect to the base in a manner which will not jeopardize the electrical connection between the base and the cover.

Moreover, another object of the invention is to provide a laptop computer having a cover which is easily manipulated to move a display screen among several operating positions.

It is also a related object of the invention to provide a method of changing the disposition of a laptop computer display screen.

The present invention advantageously provides a laptop computer display screen exhibiting an enhanced amount of information capability without necessarily expanding the physical dimensions of the base and cover of the laptop computer. The resulting rotational display screen increases the versatility and displayability of the information of many laptop computer applications including word processing, spreadsheet operations, graphics applications, Internet documents and program writing.

The above and other objects of the invention are realized in one aspect of the invention in which a portable computer comprises a base and a cover incorporating a display screen pivotally mounted to the base, the display screen having a longer dimension and a shorter dimension. A swivel arrangement is located in the cover enabling at least a portion of the cover and the display screen to be movable relative to the base between at least two orientations, one having the longer dimension in a horizontal orientation and one having the longer dimension in a vertical orientation. The base includes a keyboard and a control processing unit. The cover includes a first portion incorporating the display screen, and a second portion provided with speakers and pivotally secured to the base, the first portion being movably mounted to the second portion. The second portion of the cover includes a front wall formed with front speaker ports in communication with the speakers, and a back wall formed with back speaker ports in communication with the speakers. The front speaker ports are selectively opened and closed depending on the position of the first portion of the cover relative to the second portion of the cover. A connecting wire ribbon extends between the base and the cover, the ribbon lying between the first portion of the cover and the second portion of the cover. The display screen is movable between a first position and a second position while maintaining the one orientation having the longer dimension in the horizontal direction.

In another aspect of the invention, a portable computer comprises a base and a cover incorporating a display screen